¹Department of Anatomical Sciences, University of Calabar, Calabar, Cross River State, Nigeria; ²Department of Anatomy & Forensic Anthropology, Cross River University of Technology, Okuku, Cross River State, Nigeria.

Address for Correspondence:
Fischer, V.A.
Department of Anatomical Sciences, University of Calabar, Calabar, Cross River State, Nigeria.
vfischer2710@gmail.com
+2348037257797

Original Article

Impact of Covid-19 on the Teaching of Anatomy

¹Fischer, C.E., ²Ekanem, M.I., ¹Agaba, E.A., ¹Fischer, V.A.

Abstract

BACKGROUND AND AIM: The COVID-19 pandemic has had profound impacts on education globally. Most students have lost months of educational experience that is considered fundamental. This study aimed to provide an overview of the situation experienced by anatomy students during the COVID-19 pandemic, to determine the knowledge, attitudes and practices of anatomy students regarding online education and standard operating procedures for anatomical practical.
METHODOLOGY: The study involved the use of questionnaires and google forms.
RESULTS AND CONCLUSION: The results from this study show that COVID-19 has immensely affected how human anatomy is taught however, it has also opened up the possibilities of unconventional anatomy teaching in Nigeria. The current coronavirus pandemic has revealed the gaps in medical education. It has also shown some benefits of integrating virtual teaching and learning in the medical curriculum, primarily human anatomy. This blended learning approach will help anatomical education thrive in technology-based teaching and learning.

Keywords:
Covid-19, Anatomy, Teaching

INTRODUCTION

The outbreak of Coronavirus reported in December, 2019 in Wuhan, Hubei Province, China and declared world pandemic in March 2020 by World Health Organization (WHO, 2020) has caused unprecedented disruption to education and healthcare system worldwide (Woolliscroft, 2020, Franchi, 2020). COVID-19 and its secondary impact has caused major disruption in different sectors especially in developing countries like Nigeria. The outbreak of the virus has resulted in over 5 million deaths since 2019 (Wordometer, 2021). On average, it takes 5-6 days from when someone is infected with the virus for symptoms to show, however it can take up to 14 days (Hafeez *et al.,* 2020). COVID-19 symptoms can sometimes persist for months. The virus can damage the lungs, heart and brain which increases the risk of long-term health problems. COVID-19 increases the risks of blood clots and vessels problems. It is important to remember that most people who have COVID-19 recover quickly. But the potential long-lasting problems from COVID-19 make it even more important to reduce the spread of the disease by following

precautions such as wearing masks, avoiding crowd and keeping clean hands (Adams *et al.,* 2020). The dilemma of trying to stem the spread of infections while avoiding more harm in other areas of the health sector is at the heart of the challenges. The Government has made countering the spread and impact of COVID-19 its top priority. It has taken several measures in response – these includes halting conventional education completely. Schools with the resources needed built emergency remote learning systems almost immediately while schools without the resources had to stay closed till the government implemented measures to be followed with the pandemic. Unfortunately, most higher institutions that teach anatomy in Nigeria were affected. Some of the conditions to prevent the spread of COVID-19 include the use soap and water or an alcohol-based hand sanitizer, maintaining a safe distance from anyone who is coughing or sneezing or wearing a mask when physical distancing is not possible amongst others. These conditions can hardly be met due do the size of classrooms and laboratories as

compared to the large number of students studying anatomy related courses and the mode of teaching anatomy. Modern Anatomy considers the study of the human body from its gross form to molecular level, including its development. Anatomy or Anatomical sciences also consider the applications of the knowledge of the human body. Anatomy is, therefore, fundamental to understanding the body's functions and how both structure and function are modified by disease processes. The word "anatomy" originates from the Greek words "ana" meaning "up" and "tome" meaning "a cutting."(Abdullah *et al.*, 2020) Traditionally, studies of anatomy have involved cutting up, or dissecting, organisms. Globally, the primary concern for cadaveric dissection during this pandemic is sourcing and availability of bodies that can be used for dissection. Research findings revealed that Europe and North America relied on body donation for their cadaver sources (Habicht *et al.*, 2018). At the same time, Africa depends ultimately on unclaimed bodies with no voluntary donation record in most countries. On the other hand, South America and Asia rely on importing cadavers from other countries to supplement donations and unclaimed bodies. The International Federation of Associations of Anatomists (IFAA) acknowledges that body sourcing is usually challenging during pandemics, such as COVID-19. The possibility of contracting diseases may influence this problem during such outbreaks (Singal *et al.*, 2020). Despite the lack of proof of infection arising from contact with COVID-19 linked cadavers, the supposed risk of COVID-19 disease from such bodies cannot be downplayed. Besides, the act of dissection involves invasive procedures that exposed the handler to body fluids, droplets, or aerosols, thereby increasing the risk of infection. A significant challenge is posed on countries that rely principally on using unclaimed bodies for cadaveric dissection, as most bodies may lack medical histories to ascertain their cause of death. The unavailability of death records is an additional source of worry for anatomical education during and after the pandemic. Significantly if the surge in COVID-19 mortalities raises cadavers' obtainability for training and research, in that case, queries such as "what are the safety standard operating procedures to follow?" comes to the vanguard of medical students and educators (Onigbinde *et al.*, 2021). Notwithstanding, most developed countries have overcome this fear as high-tech gadgets gradually replace or complement traditional cadaver dissection. Therefore, many have switched to a full virtual dissection session during the COVID-19 pandemic but the same has not occurred in much of the developing countries. Considering the class sizes in developing countries, it is harder for anatomy classes and practical to be carried out. The highly contagious nature of the virus has made it difficult to continue lectures and practical as usual, thus influencing the education process, which is based on lectures and practical-based education. The pandemic puts people at risk of developing life-threatening conditions, presenting substantial challenges for medical education. These challenges have resulted in the restrictions of teaching opportunities for human anatomy students as there has been a drastic decrease in the procurement of cadavers. Other challenges include fear that students may contract the virus during their training and transmit it to the community. Additionally, students are required to stay at home and to abide by social distancing guidelines. The anatomy curriculum is one of the pillars in medical education and takes a great place in the shaping of future physicians. This study presents the impact of Covid-19 on anatomy education and a theoretical model of education which will prevent the spread of the Covid-19 infection whilst maintaining a high quality education.

METHOD

Study design

The research design used is cross-sectional and descriptive. It is designed to determine the knowledge, attitude and practices of human anatomy students pertaining to digital education.

The study will involve the use of questionnaires and will be shared among approximately 100 undergraduates of Department of Human Anatomy, Faculty of Basic Medical Sciences, University of Calabar, Calabar and University of Cross River, Okuku Campus both in Cross River State. The research includes 100 undergraduates of Human Anatomy across 200, 300 and 400 level. 100 level students were excluded from the research. The sampling technique used for this research is Simple Random sampling.

Data collection

A Google Form containing the study questionnaire and paper version was distributed among students of the Human Anatomy in the two institutions. Participants were not aware of the study aim or outcomes to reduce the risk of any possible bias. All returned questionnaires were completed. Confidentiality and anonymity was maintained by not including the name or identity of the students. All records obtained are purely for research purposes. Data was analyzed using Statistical Package for Social Sciences version 23.

RESULTS

Ninety-six (96) completed questionnaires were retrieved. Participants included 52 females (54.2%) and 44 males (45.8%). The distribution of the respondents included 200 level students (47.5%), followed by 400 level students (38%) and 300 level students (14.5%).
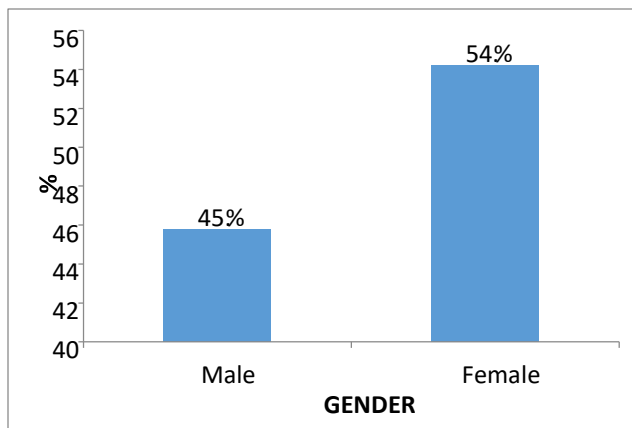
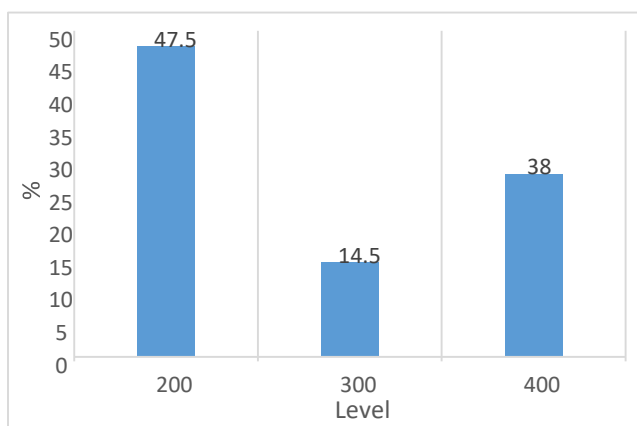Figure 1: Bar chart showing gender distribution of respondents.

Figure 2: Bar chart showing distribution of respondents' level

Effects of the pandemic on human anatomy education process

These schools suspended the educational process due to the COVID-19 pandemic. 18.8% felt unwell and self-isolated, 18.8% participated in volunteering/research activities, 18.8% also kept studying while at home, 10.4% improved their physical fitness, 29.2% practiced self learning through a program not provided by the faculty and 4% read non-medical books. 35.4% of the respondents agreed that the pandemic has changed their future career plans while 64.6% said it didn't change their career plans.

Attitude towards the covid-19 pandemic

Majority of the respondents (75%) felt they were wasting their study potential due to the pandemic and resultant school closure. 53.4% agreed that the pandemic had affected their personal wellbeing, and 52.1% were worried about being exposed to COVID-19. 38.8% of the students believed that their faculty had provided guidance for students during the pandemic. Furthermore, the majority of the respondents (69.6%) reported that the pandemic had affected the timeline of the training program, while many agreed that COVID-19 had affected their physical (58.3%), social (68.7%), and mental wellbeing (39.6%) as well as their intellectual ability to learn (68.8%).

Knowledge of students towards e-learning

Among the respondents, 93.8% had some idea about e-learning, while 89.6.6% were aware of the services provided through e-learning. Most of the respondents (82.3%) considered e-learning as being part of tele-education and 70.8% agreed e-learning can cover the practical aspect of the curriculum. 77.1% are of the opinion that e-learning is more flexible and convenient than conventional learning, 89.6% believe that student-lecturer interaction is possible through e-learning. However, only 45% agreed that their universities will succeed in establishing e-learning program.

Student practice evaluation on the use of e-learning

Some participants (52.1%) took part in online courses while 47.9% did not take part in any kind of online education during the COVID-19 pandemic. However, 68.8% reported that they used the internet for medical education purposes. Specifically, 60.4% had shared educational materials with their friends or colleagues and also reported using the internet for participating in study groups and discussions. Moreover, 68.8% used computers for learning purposes, while 75% reported buying online e-learning products instead of paper products. In addition, 58.3% had purchased electronic devices to access e-learning materials.

Standard operating procedures for anatomy practical

93.7% of the respondents agree that fixed cadavers may still pose infectious agents to the handler if proper caution is not taken, 87.5% agree that fixatives such as alcohol, formaldehyde are believed to be effective for the inactivation of infectious agents. 95.9% agree that complete personal protective equipment is vital, 95.9% also agree that hands should be scrubbed with antiseptic under running water after contact with cadavers and laboratory surfaces for at least 40-60seconds. 100% agree that there should be timetable for laboratory sessions to avoid overcrowding and a logbook comprising of names of staff, students and visitors, dates, time in and time out and contact number.

DISCUSSION

This study aimed to assess the impact of Covid-19 pandemic on human anatomy education and to evaluate their knowledge, attitudes, and practices regarding e-learning, which was proposed as a platform for providing education during the outbreak. A study performed among Libyan students during the early phase of the pandemic, found that 11% of medical students had anxiety symptoms and 22.7% had suicidal ideation (Elhadi *et al.*, 2020). Among Chinese students, 0.9% suffered from severe anxiety and 2.7% experienced moderate anxiety symptoms during the outbreak (Cao *et al.*, 2020). However, the circumstances of the respondents used for this study were reported to be different from these findings. The respondents disagreed that COVID-19 affected their mental health or caused depression

or anxiety. From the results, there is a high level of acceptance, with knowledge and positive attitude regarding e-learning, which evidences the usability of e-learning. The students reported high level of computer and information technology proficiency; about 80% of the respondents reported good or proficient skill levels. Most reported they had access to fourth-generation internet services with an acceptable or good internet connection. These findings support the feasibility of implementation of e-learning programs for the anatomy students. Some of the most commonly proposed methods of e-learning programs include, scheduled live online video lectures with interactive discussions and the utilization of several different programs or self-study online recorded lectures made available online for medical students in each university. Better image magnification and resolution in 3-dimensional view (3D) makes virtual dissection fascinating, especially when dissecting tiny structures. Virtual dissection also proffers the ability to rotate and zoom body structures or organs from different angles and planes, unlike the traditional cadaver dissection, which has limited rotation and difficulty locating some tiny structures (Anand & Singel, 2014). Another advantage of 3D models, as seen in virtual dissection, includes manipulating and creating unlimited depictions of anatomical structures using technology (Chung *et al.*, 2015). This is grossly lacking in traditional cadaver dissection. Besides, female cadavers are usually scarce; however, virtual dissection enables students to view and manipulate both 'male and female' cadaver models in the 3D form. Another competitive edge that virtual dissection has over the traditional cadaver dissection is that VD software is loaded with pathological examples for evaluation and comparison between normal and abnormal anatomical structure (Custer & Micheal, 2015).

However, 78.3% of the study participants thought that it would be difficult to participate in e-learning due to financial costs, very limited power supply and unreliable network providers.

Many institutions are giving priority to practical and clinical classes such as cadaveric dissection and anatomy laboratory sessions. Despite suboptimal numbers of donor bodies as compared to pre-COVID-19 cadaver to student ratios, this certainly does not mean that dissection has been cancelled (Ravi, 2020). Cadaver dissection during COVID-19 is not only possible, but it is also essential. Universities will undoubtedly rely heavily on technologies such as online dissection videos and anatomical lectures, dissection is too rich in educational opportunity and benefit for institutions to indefinitely curtail its use as an anatomical pedagogy (Bond, 2021, Doherty *et al.,* 2018). The experiences in the gross anatomy laboratory have been reported to be beyond dissecting and learning about arteries, veins, nerves, and muscles; it also encompasses care, team building, responsibility, cleanliness, building empathy, compassion, and courage (Scott Pearson, 2020). The development of mental and emotional processes,

empathy, compassion, and courage are other advantages of traditional cadaver dissection over virtual dissection (Iwanga *et al.,* 2021). Traditional cadaver dissection also helps in learning human variations from one cadaver to the other to widen medical knowledge scope. On the other hand, only one or two virtual models are usually available for virtual dissection, although some might have pictures taken from other traditional cadaver dissections. With the current trend in virtual teaching, all these attributes may be found wanting, and some vital traits and virtues expected of a physician may not be learned even with the most sophisticated computer software. Besides, the advantages of cadaveric dissection seem to outweigh its disadvantages, as reported by various authors in studies conducted on medical students in multiple locations (Dissabandara *et al.*, 2015).

Conclusion

Conventional human anatomy teaching practices cannot be overruled but can be complemented with evolving high-tech innovations for better understanding. The current coronavirus pandemic has revealed the gaps in medical education. It has also shown some benefits of integrating virtual teaching and learning in the medical curriculum, primarily human anatomy. This blended learning approach will help anatomical education thrive in technology-based teaching and learning.

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